

## DECLARATION BY THE CANDIDATE

I, **Manish Kumar**, certify that the work embodied in this thesis is my own bona-fide work and carried out by me under the supervision of **Dr. Cherian Samuel** from July 2013 to October 2017, at the Mechanical Engineering Department, Indian Institute of Technology (BHU), Varanasi. The matter embodied in this thesis has not been submitted for the award of any other degree/diploma. I declare that I have faithfully acknowledged and given credits to the research workers wherever their works have been cited in my work in this thesis. I further declare that I have not wilfully copied any other's work, paragraphs, text, data, results, *etc.*, reported in journals, books, magazines, reports dissertations, theses, *etc.*, or available at websites and have not included them in this thesis and have not cited as my own work.

Date:  
Place: IIT (BHU), Varanasi

Signature of the Student  
(**Manish Kumar**)

## CERTIFICATE BY THE SUPERVISOR(S)

It is certified that the above statement made by the student is correct to the best of my/our knowledge.

**Supervisor**  
(**Dr. Cherian Samuel**)

**Signature of Head of Department/Coordinator of School**  
*"SEAL OF THE DEPARTMENT/SCHOOL"*